Building Energy Simulation
User News

For Users of DOE-2, SPARK, BLAST and their Derivatives

What's New?

❁ **New e-mail address for the SRG**
Members of the Simulation Research Group have new e-mail addresses. Instead of "gundog.lbl.gov" please direct mail to "srge.lbl.gov" to reach group members.

Fred Winkelmann	fcw@srge.lbl.gov
Fred Buhl	buhl@srge.lbl.gov
Ender Erdem	ender@srge.lbl.gov
Kathy Ellington	kathy@srge.lbl.gov

❁ **Welcome! To two new DOE-2 consultants:**
Sarat Kanaka, Energy Specialist, at EcoGroup, Inc., 2085 East Technology Circle #301, Tempe, AZ 85284.
Phone is (602) 777-3000 and fax is (602) 777-3100.
and
Gopal Shiddapur, P.E., of Savage Engineering, Inc., 707 Bloomfield Avenue, Bloomfield, CT 06002. Phone is (860) 243-2707 x138, Fax is (860) 286-0718, e-mail gshiddapur@savage-alert.com.

❁ **New DOE-2 Resource Center** Tan Yune, an enthusiastic energy analyst from the Department of Architecture at the University of Auckland, is heading up the newest DOE-2 resource center, located in Auckland, New Zealand. See p. 23.

Continued on p. 11

What's Inside?

2 RESFEN 3.0

3 DOE-2.1E/32: A 32-bit compilation of DOE-2

4 Atmospheric Pollution Prediction in the BLAST Energy Simulation Program

12 BLAST News

14 DOE-2 Directory of Software and Services

18 Weather Resources

19 DOE-2 Energy Consultants

20 World-Wide Web and Internet Sites for Building Energy Efficiency

21 ACEEE 1998 Summer Study -- Call for Papers

22 International DOE-2 Resource Centers

23 International DOE-2 Energy Consultants

24 DOE-2.1E Documentation Order Form

The *Building Energy Simulation User News* is published by the Simulation Research Group at LBNL with cooperation from the BLAST Support Office at the University of Illinois. Direct comments or submissions to Kathy Ellington, Editor, MS: 90-3147, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, or e-mail kathy@srge.lbl.gov or fax us at (510) 486-4089. Direct BLAST-related inquiries to the BLAST Support Office, phone (217) 333-3977 or e-mail support@blast.bso.uiuc.edu ☺ ☺ ☺ 9/97 2000

This work was supported by the Assistant Secretary for Energy Efficiency and Renewable Energy, Office of Building Technology, State and Community Programs, Office of Building Systems of the U.S. Dept. of Energy, under Contract No. DE-AC03-76SF00098. Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory, University of California, Berkeley, California 94720 USA

RESFEN 3.0

Residential Fenestration Performance Analysis Tool

Joe Huang, Robert Sullivan, and Dariush Arasteh, Lawrence Berkeley National Laboratory, Berkeley, CA
and
Santosh Philip, Gable-Dodd Associates, Berkeley CA

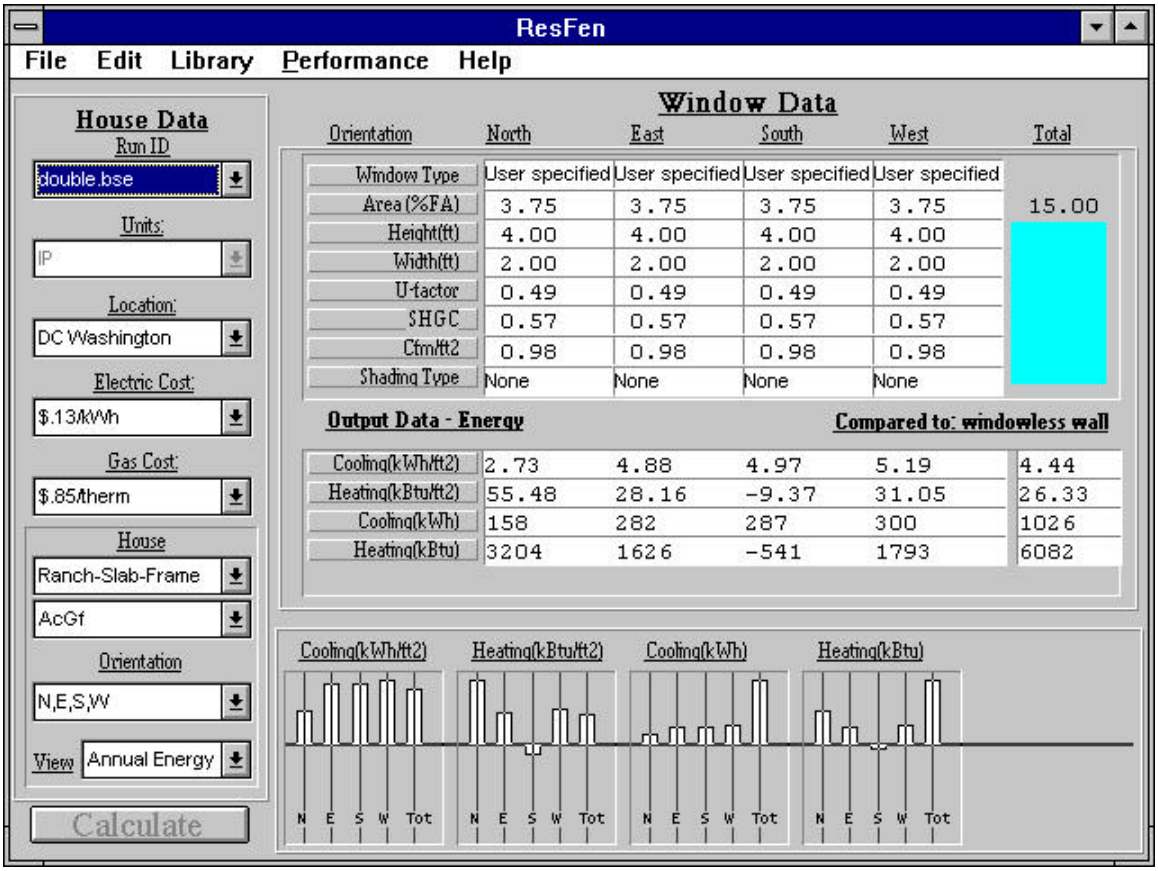
In August 1997, RESFEN 3 was completed. A program for calculating the heating and cooling energy performance and costs of residential fenestration systems, RESFEN was developed at LBNL in collaboration with the National Fenestration Rating Council (NFRC) as a simple, easy-to-use program that allows non-specialists to quickly compare the energy savings and cost benefits of different types of windows depen-ding on house type and climate. Unlike previous versions of RESFEN that used regression analysis to develop simplified algebraic expression from a large pre-calculated database of DOE-2 results, RESFEN 3.0 performs an hour-by-hour calculation using a new 32-bit compilation of the DOE-2.1E source code (see accompanying article). This use of DOE-2 as a "simulation engine" in a PC tool has been facilitated during the last few years by the exponential increase in the speed of PCs and the availability of software for quickly creating graphic user front-ends.

The RESFEN 3.0 user interface was created using Delphi™. The front-end has a limited menu of input parameters, with emphasis on the modeling of window thermal and solar properties (see Figure). Once the user has selected the desired inputs, the front-end concatenates them into a DOE-2 input file, and then executes the DOE-2.1E program. To distinguish the energy impacts of windows for each orientation, RESFEN 3.0 actually simulates four separate residential buildings, each with the window conditions in one orientation as defined by the user interface. After the simulation is com-pleted, a FORTRAN post-processing program subtracts the energy uses and peak demands for the four buildings from those for base case buildings with no windows in one orientation, to derive the incremental energy performance of the windows. These results are then displayed and plotted by the user interface. On a Pentium Pro 200Mhz machine, this entire process takes roughly 25 seconds.

RESFEN 3.0 has the capability of analyzing an almost limitless variety of window conditions in two prototypical residential buildings (one- or two-story) in 46 U.S. locations. Users can vary geographic location, electricity and gas cost, infiltration, HVAC, wall type (wood-frame or masonry), floor type (slab or crawl space), house orientation (either north, east, south, west or northeast, southeast, southwest, northwest) as well as window size, U-value, Solar Heat Gain Coefficient, window glass type, and the effects of obstructions, overhangs, and interior shades. Three types of results are displayed and plotted: heating and cooling energy consump-tion, peak energy demand, and energy costs.

A beta version of RESFEN 3.0 was released for testing by the NFRC in June. Final review of the program will be completed in early September, after which time the program will be available to all interested researchers and designers. The RESFEN 3.0 program will be distributed along with a short User's Guide. For further information on the technical details of RESFEN, please contact Joe Huang (510-486-7082 or

YJHuang@lbl.gov) or Bob Sullivan (510-486- 6843 or RTSullivan@lbl.gov).



RESFEN Menu of Input Parameters

DOE-2.1E/32: A 32-bit compilation of DOE-2

Joe Huang, Fred Winkelmann and Ender Erdem
Lawrence Berkeley National Laboratory
Berkeley, CA, USA

LBNL has recently compiled a 32-bit version of DOE-2.1E for use in PC applications. This version of DOE-2.1E is particularly suited for use in new Windows-based PC programs since it's a full 32-bit compilation that works under Windows 95 and Windows NT operating systems and is available in either EXE or DLL formats. The source code is derived from the public release version of DOE-2.1E. Also, customized DLL versions of *doebdl* and *doesim* were developed that operate only in the RESFEN 3.0 environment (see accompanying article). The Building Technologies Program at LBNL is interested in licensing this simulation engine to soft-ware developers who want to use a 32-bit simulation engine in third-party programs. For more information, please contact Joe Huang (510-486-7082 or YJHuang@lbl.gov).

Atmospheric Pollution Prediction in the BLAST Energy Simulation Program

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University of Illinois
Urbana, IL 61801

Introduction

Currently, when a new building technology is evaluated, the energy difference from a baseline building is compared to the alternatives and then the life cycle cost is performed to determine the suitable alternative. However, there are times when the lowest energy cost alternative is not necessarily the cleanest nor does it have the lowest environmental impact. Adding an algorithm to calculate the pollution produced for the design alternatives gives the designer another consideration to evaluate for a more optimal design. This pollution program calculates the amount of six different pollutants: CO, CO_2, NO_x, SO_2, Particulate Matter (PM), and Hydrocarbons (HC) for on-site and off-site energy production. To perform the calculation, the pounds of pollution for gas, oil, or coal consumption are multiplied by the average value of pollution produced by the combustion of gas, oil, and coal. For electrical energy, the regional characteristics (by state) of how electricity is produced are used to adjust the pollution coefficients. If you have done your own pollution calculations for your site and equipment, then the custom coefficients can be entered directly into the program. The default pollution coefficients and are based on the REEP model and assumptions [1].

Energy Savings

The BLAST model outputs energy as on-site fossil fuels and purchased electricity, which is derived from a variety of sources including gas, oil, coal, hydroelectric, nuclear, etc. With purchased electricity, only the fossil fuels are of interest when calculating pollution rates. The primary pollutants associated with fossil fuel combustion are: Sulfur Dioxide (SO_2), Nitrogen Oxides (NO_x), Carbon Monoxide (CO), Carbon Dioxide (CO_2), Particulate Matter (PM), and Hydrocarbons (HC). The energy calculated by the BLAST program is then converted into the amount of pollution produced. From a baseline building, alternative energy and pollution saving technologies can be explored, and the energy and pollution savings can be calculated. For energy costs the Fuel Escalation Rate for each fuel type is published by NIST annually and the nominal fuel costs and projected escalation rates for 1997 both are used in LCCID and BLCC. The nominal costs are used in the program to calculate the energy costs. The energy costs are shown in the output of the program along with the energy and individual gas pollutants.

On-Site Fossil Fuel Pollution Estimates

Using the AP-42 [2] developed by the United States Environmental Protection Agency (EPA) in conjunction with the assumptions, pollution coefficient estimates for fossil fuel energy savings were developed. Table 1, shows the final controlled pollution estimates by fossil fuel type. Gas, oil, and coal consumed can be directly converted into pounds of pollutants using these default or custom user coefficients.

Pollutant	Gas lbs/MBtu	Residual Oil lbs/MBtu	Distillate Oil lbs/MBtu	Coal lbs/MBtu
CO_2	115	170	170	200
SO_2	0.00059	1.04667	0.552817	2.9444
NO_x	0.137	0.36667	0.140845	0.584
CO	0.034	0.03333	0.035211	0.20856
HC	0.00058	0.008533	0.000408	0.00417
PM	0.003	0.08667	0.014085	0.03

Table 1: Pollution Coefficients by Fossil Fuel Type

Off-Site Electric Energy Pollution Estimates

While fossil fuels combusted on-site are straightforward in estimating pollution savings, off-site electricity is more challenging. How the electricity is produced (gas, oil, coal, nuclear, or hydro-electric) is a critical issue when estimating pollution rates. In order to improve the accuracy, state averages were used [1]. Figure 1 shows an example of the difference in how electricity is produced by state. Efficiency of electricity production was assumed to be 28.5%; this includes transmission losses, in-plant use and combustion losses [1]. Utility-sized boilers were assumed rather than the industrial-sized boilers used in on-site fossil fuel algorithms. Table 2 shows the estimated pollution rates of the fossil fuels used in generating electricity. EPA Green Lights provides regional sulfur dioxide estimates, which are aggregations of state pollution emission factors. Table 3 shows the regional sulfur dioxide estimates and their respective states.

Pollutant	Gas lbs/MBtu	Oil lbs/MBtu	Coal lbs/MBtu
SO_2	regional	regional	regional
NO_x	0.2	0.3	0.7
CO	0.039078	0.033175	0.02886
CO_2	115	170	200
PM	0.00293	0.1	0.1
HC	0.001661	0.0069	0.00481

Table 2: Pollution Coefficients for Purchased Electricity Derived From Gas, Oil, or Coal

Region	SO_2 (lbs/MBtu)	States in Region
1	2.5846	CT, MA, ME, NH, RI, VT
2	2.1969	NJ, NY, PR, VI
3	5.2983	DC, DE, MD, PA, VA, WV
4	4.45835	AL, FL, GA, KY, MS, NC, SC, TN
5	6.71983	IL, IN, MI, MN, OH, WI
6	1.4215	AR, LA, NM, OK, TX
7	5.49217	IA, KS, MO, NE
8	2.13226	CO, MT, ND, SD, UT, WY
9	0.71075	AZ, CA, HI, NV
10	0.32307	AK, ID, OR, WA

Table 3: Green Lights Regional SO_2 Estimates

The electrical energy was assumed to be divided equally between the different fossil fuels, nuclear, hydroelectric and others as per the state percentage breakdowns for electricity production. In reality this is not true, since in many cases coal is used to meet the base demand and gas is used in meeting peak demands. Theoretically, gas could dominate the fuel savings on a design day and, due to its lower emission rates, pollution produced could be lower. Also, in reality, the exact location of the electricity production is not known. At any given time the electric energy could be purchased from the utility grid and its actual origin not known. Due to the scope of the project, this complexity was not addressed. For our purpose, the pollution coefficients are adequate for the model to determine average comparisons.

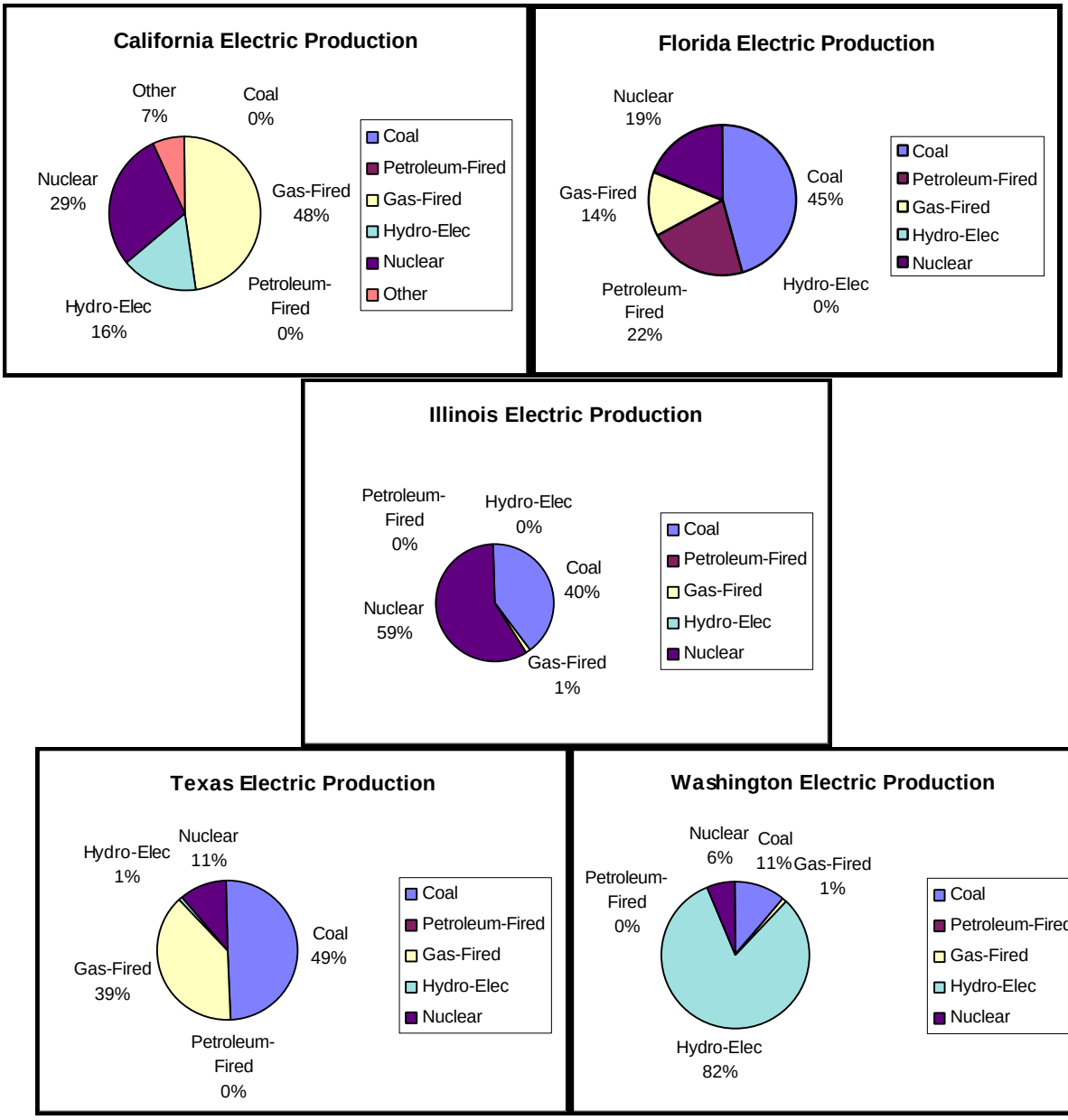

Figure 1: Fuels Used to Produce Electricity for Some Example States

Carbon Equivalent

The Intergovernmental Panel on Climate Change has studied the effects on the relative radiative forcing effects of various greenhouse gases. This effect has been called the Global Warming Potential (GWP) and is talked about in terms of Carbon Equivalent. This equivalent is based on a factor of 1.0 for carbon dioxide. This group of gases includes carbon dioxide, nitrous oxide, halocarbon emission, hydrofluorocarbons (HFC's), perfluorocarbons (PFC's), chlorofluorocarbons (CFC's), etc. From stationary combustion sources used in electric production for the heating and cooling of buildings, the only gases of concern are carbon dioxide, carbon monoxide, and nitrous oxide. Carbon monoxide is produced by combustion and its lifetime is relatively short and normally reacts to produce carbon dioxide, but it can't be ignored since it is produced in incomplete combustion and the carbon remains to interact as CO_2. Carbon dioxide and nitrous oxide are first calculated to determine their carbon equivalent and then multiplied by their GWP on a 100-year time frame. The carbon equivalents are shown in the output of the program along with the individual gas pollutants.

Pollution Output from BLAST Program

In the Heat Balance Loads Calculator (HBLC) interface to BLAST, the pollution calculation can be triggered and reported easily by the user. An example of this calculation is shown in this section of the report. Use the HBLC to specify the building, associated systems, and plants. Then check the Pollution Analysis box at the bottom right hand corner of the form as shown in Fig. 2. These four plants were specified in the HBLC interface and the pollution analysis box was checked.

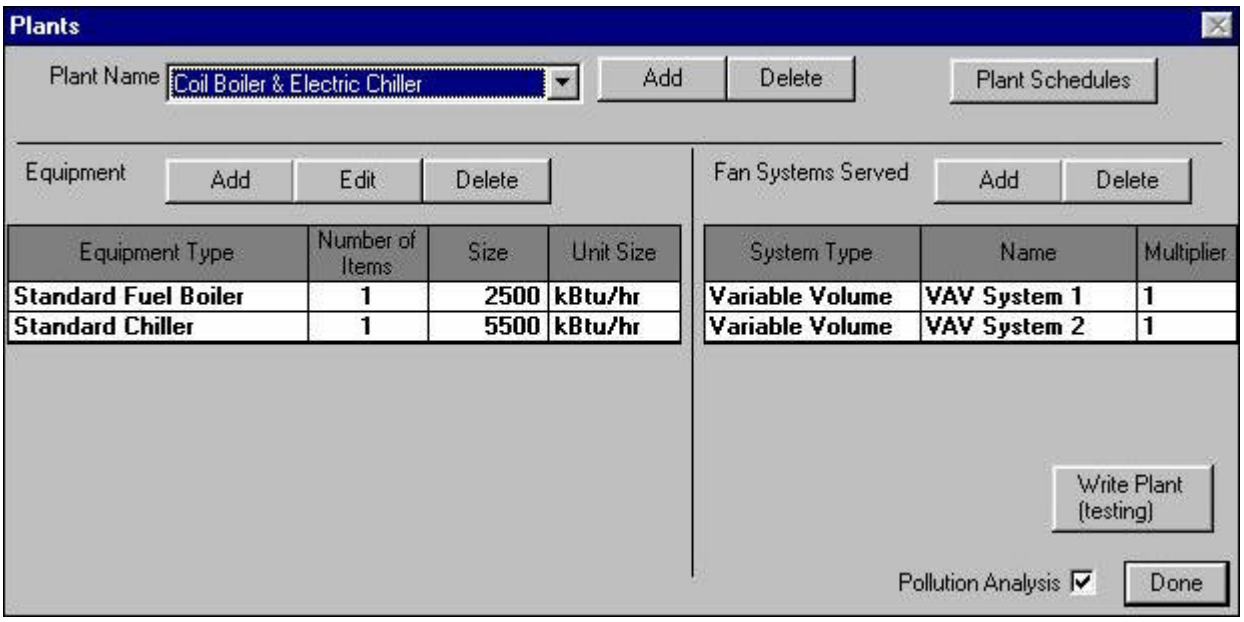

Figure 2: In this example the plants compared are these: Plant 1: Natural gas boiler and electric chiller, Plant 2: Electric boiler and electric chiller, Plant 3: Coal boiler and electric chiller, and Plant 4: Diesel boiler, generator, and electric chiller run from generator.

Then each of the plants was specified by selecting the equipment and editing the parameters. As shown in the following input form, the coal boiler fuel type was set to coal and the heat content of the fuel was set to 14,000 Btu/lb or a bituminous coal.

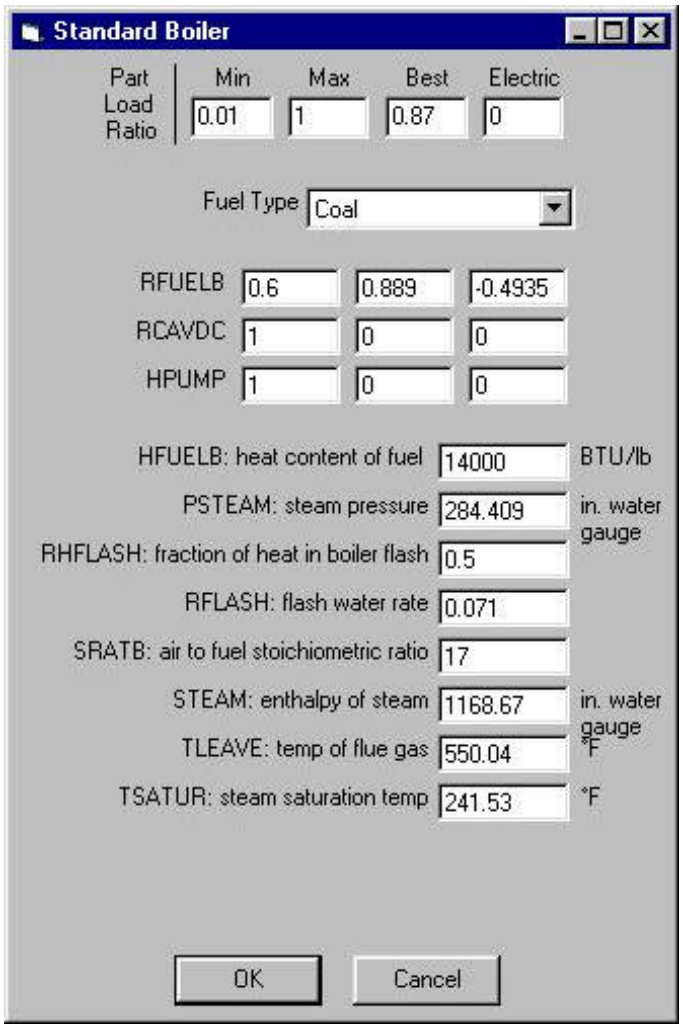

Figure 3: Input Form showing each of the plant characteristics than can be customized to equipment performance.

The higher heating values for some typical fossil fuels are shown in Table 4. The parameters for all of the plant equipment must be modified to user specifications.

Higher Heating Value of Fuels	
Coal	~9000 to 14000 Btu/lb.
Fuel Oil (Distillate Oil)	18800 Btu/lb.
Residual Oil or Crude	19500 Btu/lb.
Natural Gas	20013 Btu/lb.

Table 4: Higher Heating Value of Fuels in Btu/Lb.

From the Calculate menu in HBLC the input file is created with “Create Input File” using the annual run and the weather file for the location. Then the loads are calculated using BLAST with the “Calculate Loads” selection.

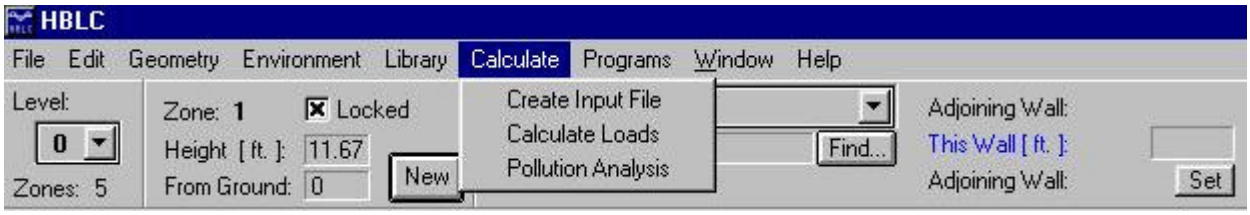

Figure 4: HBLC Calculate Menu

After the annual run has been performed for the 8760 hours, you can specify the Pollution Analysis as the last selection on the Calculate menu. If the program does not automatically choose the correct state for the simulation it can be selected from the drop down menu in the lower left corner of the following form. The coefficients and energy costs will either have the default values or the custom values that you have entered. If the values have been changed, you can again return to the defaults by selecting the “Defaults” button. When satisfied, the “Run” button is selected.

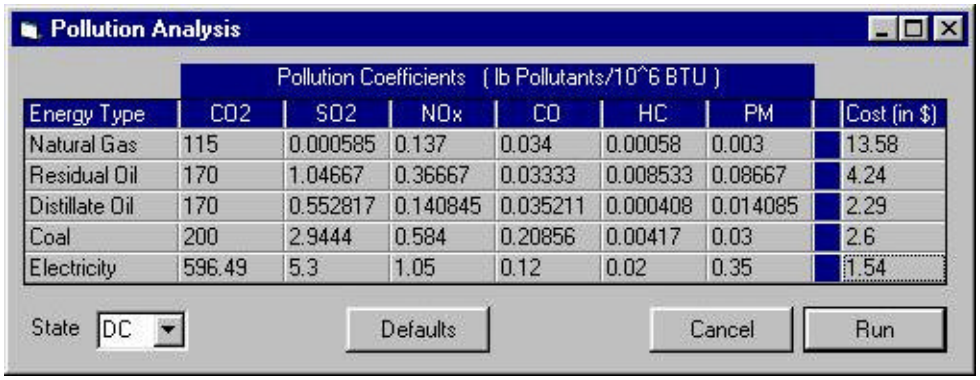

Figure 5: The Calculate Menu's Pollution Analysis Form

After selecting the “Run” button on the pollution analysis form, the calculations are automatically completed and displayed in the Output Viewer as shown in the following figure. The figure shows the graph for the Total Pollutants minus the carbon dioxide. The carbon dioxide is shown separately since it is typically orders of magnitude larger than the other pollutants. On the right hand side is the total energy by fuel type, total energy dollars for each plant, and the carbon equivalent for each plant.

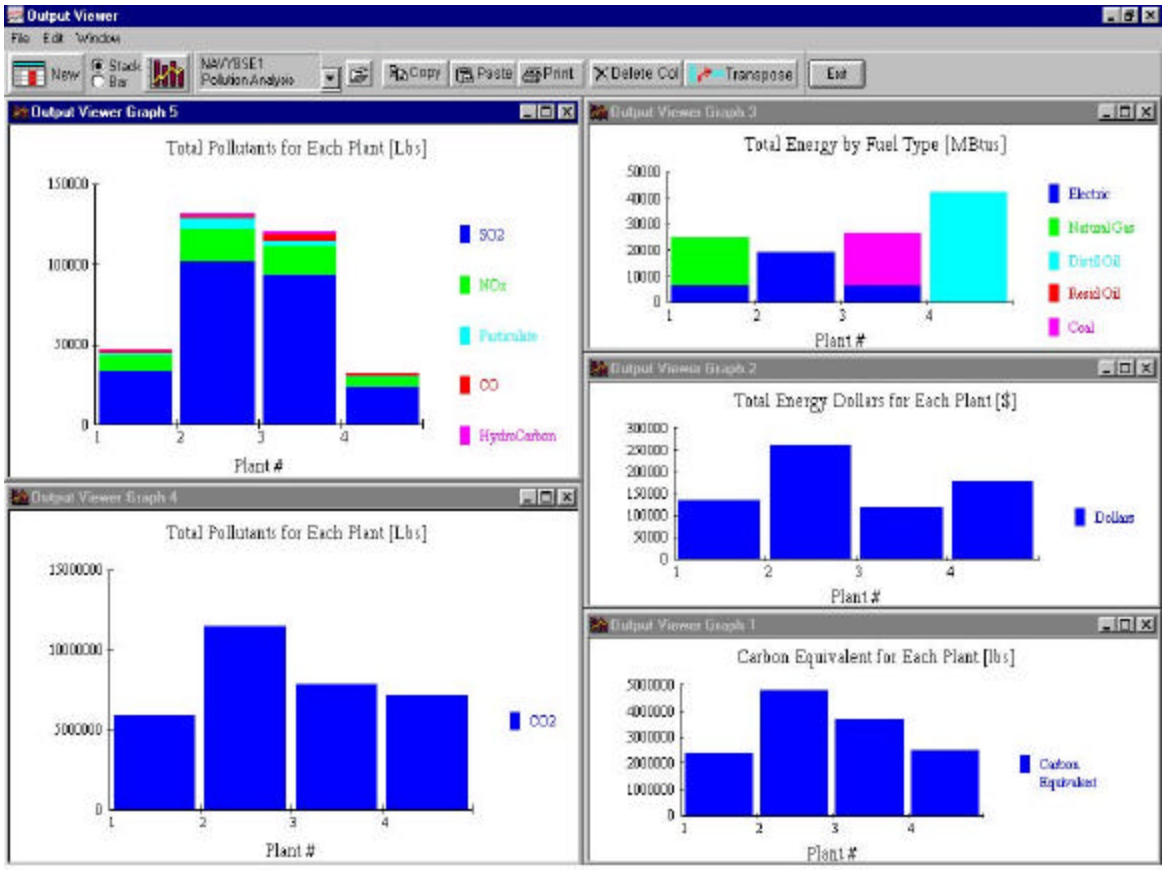

Figure 6: Output viewer showing total pollutants in pounds (minus carbon dioxide)

The values for each graph are stored in tables that are minimized and can be accessed for viewing or analysis in other programs. The Total pollutants are shown below in pounds.

Output Viewer Table 4

Total Pollutants for Each Plant [Lbs]

To Select: Column:Ctr-Click Row:Shift-Click

Plant #	SO2	NOx	Particulate	CO	CO2	HydroCarbon
1	33453.83	9160	2264	1386.2	5891352	136.93
2	101760	20160	6720	2304	11452610	384
3	93214.33	18480.7	2817.5	4990.968	7823852	210.851
4	23350.99	5949.293	594.9504	1487.313	7180800	17.2339

Figure 7: Total pollutants in pounds (minus carbon dioxide) in table format

Using the pollution calculation in the HBLC interface and BLAST program gives the user an easy way to compare energy and pollution technologies graphically.

Conclusion

In conclusion, the default coefficients used for the pollution calculation were based on the REEP model produced by USACERL and the US EPA AP-42 documentation. You have the choice of using these defaults or inputting their own custom coefficients. The program uses these coefficients to calculate the pollutants and compare them easily in a graphical form with the Output Viewer. The pollution calculations will be included with the next release of BLAST, later this year.

References

[1] "Pollution Reduction Through Energy Conservation, REEP Model", Peter G. Stroot, Robert J. Nemeth, & Donald F. Fournier, from USACERL

[2] "AP-42 Compilation of Air Pollutant Emission Factors Volume I: Stationary Point and Area Sources", Supplement D September 1991

[3] "Atmospheric Pollution Prediction in a Building Energy Simulation Program", Richard J. Liesen Ph. D., University of Illinois, April, 1997, Completed under an Interagency Agreement between the U.S. Environmental Protection Agency and the U.S. Army Construction Engineering Research Laboratories

Acknowledgement

This work was supported by the U.S. Environmental Protection Agency

What's New? (continued)

Now THAT'S Radiant Heating!

(*from Home Energy Magazine, July/August 1997)*

In a vision worthy of the *Friendly Atom* comics of the 1950s, the Microwave Research Center is examining how to use microwaves to heat people directly. Charles Buffler, a researcher at the center, is working on low-power microwaves that supposedly barely penetrate the skin and have "no adverse effects." Buffler and a colleague have already started experimenting with the concept - using themselves as its first human subjects. Irradiated by a 500W microwave emitter, they experienced sensible warmth when radiation reached 500 milliwatts per square centimeter (mw/cm^2) and comfort between 35 mw/cm^2 and 50 mw/cm^2. This is about $1/20^{th}$ of the radiation used in a microwave oven. Buffler envisions motion-detecting microwave emitters in every room of a house, keeping people, pets, and food warm without wasting energy on furniture and air. [*Popular Science*, Apr. 1997. Times Mirror Magazines, 2 Park Avenue, New York, NY 10016]

So Much Software, So Little Time

A reminder that the LBNL programs

SUPERLITE-2.0
WIINDOW-4.1

and

THERM-1.0

are available from Pat Ross of the Building Technologies Program (e-mail PLRoss@lbl.gov or fax 510-486-4089 for details).

For the ADELINE-2.0 program, contact Charles Erlich (e-mail CKEhrlich@lbl.gov or fax 510-486-4089).

"Building Loads Analysis and System Thermodynamics"

blastnews

BLAST Support Office (BSO)

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1206 West Green Street
Urbana, IL 61801

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http://www.bso.uiuc.edu

The **Building Loads Analysis and System Thermodynamics (BLAST)** system is a comprehensive set of programs for predicting energy consumption and energy system performance and cost in buildings. The BLAST system was developed by the U.S. Army Construction Engineering Research Laboratory (USACERL) under the sponsorship of the Department of the Air Force, Air Force Engineering and Services Center (AFESC), and the Department of the Army, Office of the Chief of Engineers (OCE). After the original release of BLAST in December 1977, the program was extended and improved under the sponsorship of the General Services Administration, Office of Professional Services; BLAST Version 2.0 was released in June 1979. Under the sponsorship of the Department of the Air Force, Aeronautical System Division, and the Department of Energy, Conservation and Solar Energy Office, the program was further extended; BLAST Version 3.0 was completed in September 1980. Since 1983, the BLAST system has been supported and maintained by the BLAST Support Office at the University of Illinois at Urbana-Champaign.

BLAST can be used to investigate the energy performance of new or retrofit building design options of almost any type and size. In addition to performing peak load (design day) calculations necessary for mechanical equipment design, BLAST also estimates the annual energy performance of the facility, which is essential for the design of solar and total energy (cogeneration) systems and for determining compliance with design energy budgets. Repeated use of BLAST is inexpensive; it can be used to evaluate, modify, and re-evaluate alternate designs on the basis of annual energy consumption and cost.

The BLAST analysis program contains three major subprograms:

- The Space Load Prediction subprogram computes hourly space loads in a building based on weather data and user inputs detailing the building construction and operation.
- The Air Distribution System Simulation sub-program uses the computed space loads, weather data, and user inputs describing the building air- handling system to calculate hot water, steam, gas, chilled water, and electric demands of the building and air-handling system.
- The Central Plant Simulation subprogram uses weather data, results of the air distribution system simulation, and user inputs describing the central plant to simulate boilers, chillers, on-site power generating equipment and solar energy systems; it computes monthly and annual fuel and electrical power consumption.

Heat Balance Loads Calculator (HBLC)
The BLAST graphical interface (HBLC) is a Windows-based interactive program for producing BLAST input files. HBLC allows the user to visualize the building model as it is developed and modify previously created input files. Within HBLC, each story of the building is represented as a floor plan which may contain several separate zones. Numerous other building details may be investigated and accessed through simple mouse operations. On-line helps provide valuable on-the-spot assistance that will benefit both new and experienced users. HBLC is an excellent tool which will make the process of developing BLAST input files more intuitive and efficient. You can download a demo version of HBLC (for MS Windows) from the BLAST website (User manual included!).
A FREE UPGRADE IS AVAILABLE to registered users, as of July 11. To obtain a password and instructions for downloading, e-mail to: support@blast.bso.uiuc.edu, or call (217) 333-3977. This upgrade may also be obtained by post for a nominal fee.

WINLCCID 97
LCCID (Life Cycle Cost in Design) has been a standard in the DoD community since its initial release in 1986. LCCID was developed to perform Life Cycle Cost Analyses (LCCA) for the Department of Defense and their contractors, yet it goes far beyond being just a DoD study tool by providing many features of a general purpose life cycle costing tool. With LCCID, it's easy to carry out "what-if" analyses based on variables such as present and future costs and/or maintenance and repair costs. LCCID allows an analysis based on standard DoD procedures and annually updated escalation factors as well as Energy Conservation Investment Program (ECIP) LCCA. You can download a demo version of WINLCCID 96 (for MS Windows) from the BLAST website. [See *User News* Vol. 16, No. 4, p. 5].

To order BLAST-related programs, contact Kavon Pontius at the BLAST Support Office

BLAST Order Information

Program Name	Order Number	Price Each
PC BLAST Package The standard PC BLAST Package includes the following programs: BLAST, HBLC, BTEXT, WIFE, CHILLER, Report Writer, Report Writer File Generator, Comfort Report program, Weather File Reporting Program, Control Profile Macros for Lotus or Symphony, and the Design Week Program. A soft copy of the BLAST manual will be included as help files with the software. The Portable BLAST Package does *not* include HBLC or HBLC source. Executable version of BLAST Software Package for an IBM 386/486/Pentium with a Numeric Co-Processor	3B386E3-0695	$950.00
PORTABLE BLAST (on DOS Formatted Disks) Source code plus PC Executables and HBLC	3BPORA3-0695	$1500.00
WINLCCID 97: executable version for 386/486/Pentium	3LCC3-0797	$295.00
WINLCCID 96 (update from Level 92)	4LCC3-0797	$195.00
BLAST 3.0 Documentation Set (Enter Quantity)		
Printed version in a 3-ring binder	1001-0695	$250.00

The last four digits of the catalog number indicate the month and year the item was released or published. This will enable you to see if you have the most recent version. All software will be shipped on 3.5" high density floppy disks unless noted otherwise.

DOE-2 DIRECTORY

Program Related Software and Services

Contact the vendors for prices and ordering information

Mainframe and Workstation Versions of DOE-2

DOE-2.1D and 2.1E (Source code, executable code and documentation) For 2.1E DEC-VAX, Order #000158-DOVAX-02 For 2.1E SUN-4, Order #000158-SUN-0000 For 2.1D DEC-VAX, Order #000158-D6220-01 For a complete listing of the software available from ESTSC order their "Software Listing" catalog ESTSC-2. [See *User News* Vol. 16, No. 3, p. 21]	Energy Science Technology Software Center (ESTSC) P.O. Box 1020 Oak Ridge, TN 37831-1020 Phone: (615) 576-2606 Fax: (615) 576-2865 ESTSC@ADONIS.OSTI.GOV www.doe.gov/html/osti/
FTI-DOEv2.1E (Source code and documentation) Source code for both the Lawrence Berkeley National Laboratory distribution and FTI/DOE. The LBNL version is the combined SUN and VAX versions. FTI/DOE is fully portable and ready to compile. This is the source code distribution only. No executables are included with the package. Executables for most platforms are available. [See *User News* Vol. 12, No. 4, p. 16]	Finite Technologies, Inc 3763 Image Drive Anchorage, AK 99504 Contact: Scott Henderson Phone: (907) 333-8933 Fax: (907) 333-4482 info@finite-tech.com www.finite- tech.com/

PC Versions of DOE-2

ADM-DOE2 ADM-DOE2 (DOE-2.1E) is compiled for use on 386/486 PCs with a math co-processor and 4MB of RAM. It runs in a DOS or Windows environment and is a highly reliable and tested version of DOE-2 which contains all of the 1994/95 enhancements to the program. The package contains everything needed to run the program: program files, utilities, sample input files, and weather files. More than 300 weather files are available (TMY, TRY, WYEC, CTZ formats) for the U.S. and Canada. [See *User News* Vol. 7, No. 2, p. 6]	ADM Associates, Inc. 3239 Ramos Circle Sacramento, CA 95827 Contact: Marla Sullivan, Sales Phone: (916) 363-8383 Fax: (916) 363-1788
CECDOEDC (Version 1.0A) A microcomputer version of DOE-2.1D with a pre- and post-processor designed strictly for compliance use within the State of California. It generates some of the standard compliance forms as output. Order P40091009 for the CECDOEDC Program with Manuals. Order P40091010 for the DOE-2.1 California Compliance Manual. [See *User News* Vol. 12, No. 4, p. 13]	MS: 13 – Publication Office California Energy Commission P.O. Box 944295 Sacramento, CA 94244-2950 Phone: (916) 654-5106
EnergyPro (Win/DOE) A new Windows-based building energy analysis program designed to run on WindowsNT and Windows95. EnergyPro provides a next-generation interface for fast inputting and analyzing; including drag-and-drop, cut/copy/paste, and full graphic printout. Nonresidential modules include heating and cooling loads, California Title 24 Prescriptive Method compliance calculations, and tailored lighting calculations. A version of DOE-2 is available for use outside California.	Gabel-Dodd / EnergySoft, LLC 100 Galli Drive, Suite 1 Novato, CA 94949 Contact: Demian VonderKuhlen Phone: (415) 883-5900 Fax: (415) 883-5790 Martyn@energysoft.com www.energysoft.com

Caveat : We list third-party DOE-2-related products and services for the convenience of program users, with the understanding that the Simulation Research Group does not have the resources to check the DOE-2 program adaptations and utilities for accuracy or reliability.

PC Versions of DOE-2 (continued)

DOE-Plus DOE-Plus, a complete implementation of DOE-2.1D, is used to interactively input a building description, run DOE-2, and plot graphs of simulation results. Interactive error checking, context-sensitive help for all DOE-2 keywords, a 3-D view of the building that can be rotated, and several useful utilities. Also from ITEM Systems: **Demand Analyzer,** uses templates of building types and vintages to simplify DOE-2 input requirements. Online help feature. **Prep,** a batch preprocessor, ideal for parametric studies, that enables conditional text substitution, expression evaluation, and spawning of other programs. [See *User News* Vol. 11, No. 4, p. 4 and Vol. 13, No. 2, p. 54, and Vol. 16, No. 1, p. 28-32	ITEM Systems 321 High School Road NE, #344 Bainbridge Isl., WA 98110 Contact: Steve Byrne Phone: (206) 855-9540 Fax: (206) 855-9541 byrne@item.com
EZDOE EZDOE is an easy-to-use PC version of DOE-2.1D. It provides full screen, fill in the blank data entry, dynamic error checking, context-sensitive help, mouse support, graphic reports, a 750-page user manual, extensive weather data, and comprehensive customer support. EZDOE integrates the full calculation modules of DOE-2 into a powerful, full implementation of DOE-2 on DOS-based 386 and higher computers. [See *User News* Vol. 14, No. 2, p. 10 and No. 4, p. 8-14]	Elite Software, Inc. P.O. Drawer 1194 Bryan, TX 77806 Contact: Bill Smith Phone: (409) 846-2340 Fax: (409) 846-4367 76070.621@compuserve.com
FTI-DOEv2.1E Highly optimized version of DOE-2.1E software, available for most computing systems. Current support: MSDOS and Windows 3.x, Windows NT, (AIX), NeXT, and SUN. Call for platforms not listed. Documentation and weather files are available. [See *User News* Vol. 12, No. 4, p. 16]	Finite Technologies, Inc 821 N Street, #102 Anchorage, AK 99501 Contact: Scott Henderson Phone: (907) 333-8933 Fax: (907) 333-4482 Info@finite-tech.com www.finite-tech.com/fti/
MICRO-DOE2ä MICRO-DOE2 (2.1E), running in a DOS or Windows environment, is a widely used, reliable, and tested PC version of DOE-2.1E. It includes automatic weather processing, batch file creation, and a User's Guide with instructions on how to set up a RAM drive. System requirements: 386/486 PC with 4 MB of RAM and math co-processor. Also from ACROSOFT/CAER Engineers: **NETPath**, a network edition of MICRO-DOE2 for up to five users, allows you to store and run DOE-2 application files on one machine using input files from another machine. The result is improved space usage and project file management. **POWERPath**, for single machines, allows you to keep MICRO-DOE2 application files in one directory and submit input from any other directory. **BDL Builder** is a user-friendly Windows-implemented pre-processor for DOE-2.1E that allows the description of specific building and HVAC characteristics with numeric input by preparing databases, or building blocks, and then selecting records from the databases to assemble a complete input. **E2BB** translates existing DOE-2.1E text input to BDL Builder. **Weather Files** for most U.S., Canadian, and European cities are available in various formats, including TRY, TMY, CTZ, and WYEC. [See *User News* Vol. 7, No. 4, p. 2; Vol. 11, No. 1, p. 2; Vol. 15, No. 1, p. 8; Vol. 15, No. 3, p. 4; Vol. 16, No. 2, p. 1,7; Vol. 16, No. 4, p. 7-8]	ACROSOFT / CAER Engineers 1204-1/2 Washington Avenue Golden, CO 80401 Contact: Don Croy Phone: (303) 279-8136 Fax: (303) 279-0506 102447.2611@COMPUSERVE.COM 

PC Versions of DOE-2 (continued)

PRC-DOE2 A fast, robust and up-to-date PC version of DOE-2.1E. Runs in extended memory, is compatible with any VCPI compliant memory manager and includes its own disk caching. 377 weather data files available (TMY, TRY, WYEC, CTZ) for the U.S. and Canada **PRC-TOOLS** is a set of PC programs that aids in extracting, analyzing and formatting hourly DOE-2 output. Determines energy use, demand, and cost for any number of end-uses and periods. Automatically creates 36-day load shapes. Custom programs also available.	Partnership for Resource Conservation 140 South 34th Street Boulder, CO 80303 Contact: Paul Reeves Phone: (303) 499-8611 FAX: (303) 554-1370 paulreeves@aol.com
VisualDOE 2.5 for Windows ™ VisualDOE 2.5, which uses DOE-2.1E as the calculation engine, enables architects and engineers to quickly evaluate the energy savings of HVAC and other building design options. Program is supported by a graphical interface and on-line help. Program includes climate data for the 16 California weather zones. A demo can be downloaded from http://www.eley.com. [See *User News* Vol. 15, No. 2, p. 10; Vol. 16, No. 4, p. 9-16; Vol. 17, No. 4, p. 8-13]	Eley & Associates 142 Minna Street San Francisco, CA 94105 Charles Eley or John Kennedy Phone: (415) 957-1977 / Fax: -1381 celey@eley.com www.eley.com

Pre- and Post-Processors for DOE-2

DrawBDL DrawBDL, Version 2.02, is a graphic debugging and drawing tool for DOE-2 building geometry; it runs on PCs under Microsoft Windows. DrawBDL reads your BDL input and makes a rotatable 3D drawing of your building with walls, windows, and building shades shown in different colors for easy identification. [See *User News*, Vol. 14, No. 1, p. 5-7, Vol. 14, No. 4, p. 16-17, and Vol. 16, No. 1, p.37]	Joe Huang & Associates 6720 Potrero Avenue El Cerrito, CA 91364 Contact: Joe Huang Phone/Fax:: (510) 236-9238
Visualize-IT Visual Data Analysis Tools The ***Energy Information Tool*** is a Microsoft Windows 3.1 program for looking at and understanding metered or DOE-2.1E hourly input data. It provides the unprecedented ability to see all 8760 (or 35040) data points for a year's worth of data. You get an overview of the data with an EnergyPrint™ and can then explore the data with a variety of tools including load shapes, load duration curves, etc. This program requires a 486 computer and SVGA graphics capabilities. The ***Calibration Tool*** is a Microsoft Windows 3.1 program for comparing DOE-2.1E hourly output data to total load and/or end-use metered data. Options include monthly demand and load 2D graphs, maximum and seasonal load shapes, average load profiles, end use residuals, monthly average week and weekend days, and dynamic comparison load shapes. This program requires a 486 computer and SVGA graphics capabilities. [See *User News* Vol. 17, No. 2, p. 2-6]	RLW Analytics, Inc. 1055 Broadway, Suite G Sonoma, CA 95476 Contact: Jim McCray Pat Bailey Jedd L. Parker Phone: (707) 939-8823 Fax: (707) 939-9218 info@rlw.com www.rlw.com
D O E 1 2 3 Uses Lotus 1-2-3 to graphically display DOE-2.1D output as bar charts, pie charts, and line graphs. [See *User News* Vol. 10, No. 3, p. 5]	Ernie Jessup 4977 Canoga Avenue Woodland Hills, CA 91364 Phone: (818) 884-3997
Graphs for DOE-2 2-D, 3-D, hourly, daily, and psychrometric plots [See *User News* Vol. 13, No. 1, p. 5]	Energy Systems Laboratory Texas A&M University College Station, TX 77843 Contact: Jeff Haberl Phone : (409) 845-6065 Fax: (409) 862-2762
Pre-DOE A math pre-processor for BDL.	Nick Luick 19030 State Street Corona, CA 91719 Phone: (714) 278-3131

TOOLS AND TRAINING

User News **(a quarterly newsletter)** Sent without charge, the newsletter prints documentation updates and changes, bug fixes, inside tips on using the programs more effectively, and articles of special interest to users of DOE-2, BLAST, SPARK and their derivatives. The winter issue features an index of articles printed in all the back issues. Also available electronically at http://eande.lbl.gov/BTP/SRG/UNEWS	Simulation Research Group Bldg. 90, Room 3147 Lawrence Berkeley National Laboratory Berkeley, CA 94720 Contact: Kathy Ellington Fax: (510) 486-4089 kathy@srge.lbl.gov
Help Desk Bruce Birdsall Call or fax Bruce Birdsall if you have a question about using DOE-2. If you need to fax an example of your problem to Bruce, please be sure to telephone him prior to sending the fax. This is a free service provided by the Simulation Research Group at Lawrence Berkeley National Laboratory.	Bruce Birdsall Phone/Fax: (510) 829-8459 Monday through Friday 10 a.m. to 3 p.m. Pacific Time
Training DOE-2 courses for beginning and advanced users.	Energy Simulation Specialists, Inc. 64 E. Broadway, Suite 230 Tempe, AZ 85282 Contact: Marlin Addison Phone: (602) 784-4500
Instructional DOE-2 Video and Manual Takes you step-by-step in DOE-2.1D input preparation and output interpretation.	Dr. Michael Brandemuehl, Director JCEM/U. Colorado CEAE Dept CB 428 Boulder, CO 80309-0428 Phone: (303) 492-3915, fax 492-7317

DOE-2.1E Bug Fixes via FTP

If you have Internet access you can obtain the latest bug fixes to the LBNL version of DOE-2.1E by anonymous ftp. Here's how…

ftp to either gundog@lbl.gov or to 128.3.254.10
login: *type* anonymous
passwd: *type in your e-mail address*

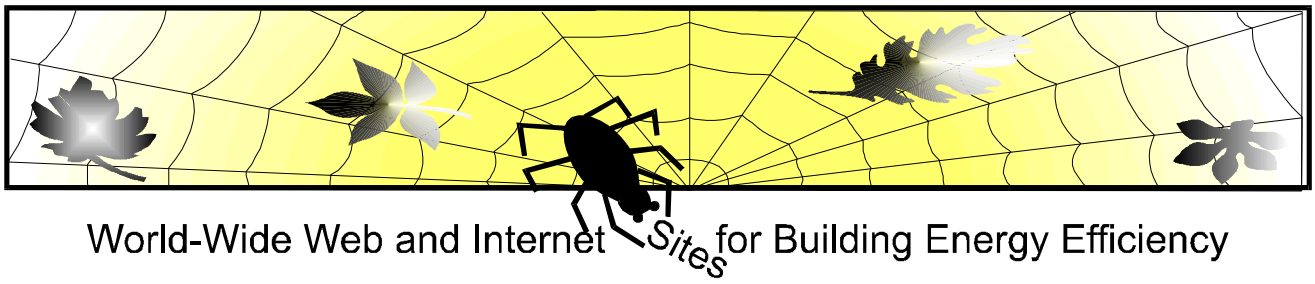
After logging on, go to directory pub/21e-mods ; bug fixes are in files that end with **.mod** . A description of the fixes is in file **VERSIONS.txt** in directory **pub** . Each fix has its own version number, ***nnn*** , which is printed out as DOE-2.1E- *nnn* on the DOE-2.1E banner page and output reports when the program is recompiled with the fix. You may direct questions about accessing or incorporating the bug fixes to Ender Erdem (ender@gundog.lbl.gov).

WEATHER RESOURCES

TMY2 weather data for DOE-2. ENERGOS will provide TMY2 data for 239 cities converted for use with DOE-2 for PC versions of the program (DOE-2.1C through DOE-2.1E).	Kurmit Rockwell ENERGOS 1705-14th Street, #401 Boulder, CO; 80302 Phone: (303) 499-7907 / Fax: (303) 449-7605
Comprehensive collection of **TRY**, **TMY** and **CTZ** weather file libraries, from NCDC, which can be used on all PC versions of DOE-2. Includes original source data and pre-formatted packed versions on a single IBM format CD. For Canadian users, the CD contains five weather files representing the five climate regions established by the Canadian energy codes. Individual sites available.	Jenny Lathum or Martyn Dodd Gabel Dodd / EnergySoft, LLC 100 Galli Drive, Suite 1 Novato, CA 94949 Phone: (800) 467-4738 Fax: (415) 883-5970
European Weather Files	Andre Dewint Alpha Pi, s.a. rue de Livourne 103/12 B-1050 BRUXELLES, Belgium Phone: 32-2-649-8359 / Fax: 32-2-649-9437
TMY data sets - download from the World Wide Web **TMY2** data sets and **TMY2 User Manual** - download from the World Wide Web [See *User News* Vol. 18, no. 2, p. 17]	TMY: http//oipea-www.rutgers.edu/html_docs/TMY/tmy.html TMY2: http://rredc.nrel.gov/solar/
TMY (Typical Meteorological Year) **TRY** (Test Reference Year)	National Climatic Data Center 151 Patton Avenue, #120 Asheville, NC 28801 Phone: (704) 271-4871 order / Fax 271-4876
CTZ (California Thermal Climate Zones)	California Energy Commission Bruce Maeda, MS-25 1516-9th Street Sacramento, CA 95814-5512 1-800-772-3300 Energy Hotline
WYEC (Weather Year for Energy Calculation)	ASHRAE 1791 Tullie Circle N.E. Atlanta, GA 30329 Phone: (404)636-8400 / Fax: (404)321-5478
Canadian Weather Files in WYEC2 Format [Note: the original long-term data sets, up to 40 years of data, from which the CWEC files were derived can also be obtained directly from Environment Canada. Contact Mr. Robert Morris at (416) 739-4361.]	Dr. Didier Thevenard Watsun Simulation Lab University of Waterloo Waterloo, Ont., N2L-3G1 Canada Phone: (519) 888-4904 / Fax: (519) 888-6197 watsun@helix.watstar.uwaterloo.ca

DOE-2 ENERGY CONSULTANTS

Arizona				
Sarat Kanaka	EcoGroup, Inc., Suite 301	2085 E. Technology Circle	Tempe, AZ 85284	(602) 777-3000
Chuck Sherman	Energy Simulation Specialists	64 East Broadway, #230	Tempe, AZ 85282	(602) 784-4500
California				
George Marton	1129 Keith Avenue		Berkeley, CA 94708	(510) 841-8083
Jeff Hirsch	James J. Hirsch Associates	12185 Presilla Road	Camarillo, CA 93012	(805) 532-1045
Leo Rainer	Davis Energy Group, Inc.	123 C Street	Davis, CA 95616	(916) 753-1100
L. Heshong, D. Mahone	The Heshong Mahone Group	11622 Fair Oaks Blvd, #111	Fair Oaks, CA 95628	(916) 962-7001
Steven D. Gates, P.E.	11608 Sandy Bar Court		Gold River, CA 95670	(916) 638-7540
David J. Schwed	Romero Management Assoc	1805 West Avenue K	Lancaster, CA 93534	(805) 940-0540
Robert E. Gibeault	A-TEC	5515 River Avenue, # 301	Newport Beach, CA 92663	(714) 548-6836
Martyn C. Dodd	Gabel Dodd/EnergySoft, LLC	100 Galli Drive, # 1	Novato, CA 94949	(415) 883-5900
Robert Mowris, P.E.	10 Ridge Road		Orinda, CA 94563	(510) 254-9770
Greg Cunningham	EnerSys Solutions LLC	114 Sansome St., #1201	San Francisco, CA 94104	(415) 296-9760
Charles Eley	Eley Associates	142 Minna Street	San Francisco, CA 94105	(415) 957-1977
Chandra Shinde, P.E.	ENVIRODESIGN GROUP	385 S. Lemon Ave., E-266	Walnut, CA 91789	(909) 598-1980
Colorado				
David A. Cohen	Architectural Energy Corp	2540 Frontier Ave, #201	Boulder, CO 80301	(303) 444-4149
Ellen Franconi	P.O. Box 1284		Boulder, CO 80306	(303) 786-7319
Kurmit Rockwell	Rocky Mtn Energy Services	1705 14th Street, # 401	Boulder, CO 80302	(303) 499-7907
Charles Fountain	Burns & McDonnell	8055 E. Tufts Avenue, #330	Denver, CO 80230	(303) 721-9292
Susan Reilly	Enermodal Engineering	1554 Emerson Street	Denver, CO 80218	(303) 861-2070
Donald E. Croy	Acrosoft/CAER Engineers	814 Eleventh Street	Golden, CO 80401	(303) 279-8136
Joel Neymark, P.E.	2140 Ellis Street		Golden, CO 80401	(303) 384-3672
Norm Weaver	Interweaver Consulting	P.O. Box 775444	Steamboat Spgs, CO 80477	(970) 870-1710
Connecticut				
Adrian Tuluca	Steven Winter Associates	50 Washington Street	Norwalk, CT 06854	(203) 852-0110
Florida				
Philip Wemhoff	1512 South McDuff Avenue		Jacksonville, FL 32205	(904) 632-7393
Dr. Paul Hutchins PE,CEM	Reynolds Smith & Hills, Inc.	4651 Salisbury Road	Jacksonville, FL 32256	(904) 279-2277
Georgia				
Lung-Sing Wong	Building Performance Engrs.	1351 Oakbrook Dr., #100	Norcross, GA 30093	(770) 409-0400
Illinois				
Michael P. Doerr	Skidmore Owings Merrill	224 S Michigan Ave # 1000	Chicago, IL 60604	(312) 360-4623
Gary H. Michaels, P.E.	G.H. Michaels Associates	1512 Crain Street	Evanston, IL 60202	(847) 869-5859
Prem N. Mehrotra	General Energy Corp.	230 Madison Street	Oak Park, IL 60302	(708) 386-6000
Robert Henninger, P.E.	GARD Analytics, Inc.	1028 Busse Highway	Park Ridge, IL 60068-1802	(847) 698-5686
Kansas				
Dr. Brian A. Rock, P.E.	Marvin Hall	University of Kansas	Lawrence, KS 66045-2222	(913) 864-3434
Missouri				
Mike Roberts	Roberts Engineering Co.	11946 Pennsylvania	Kansas City, MO 64145	(816) 942-8121
Bruce A. Leavitt, P.E.	Wm. Tao & Associates Inc.	2357-59th Street	St. Louis, MO 63110	(314) 644-1400
Montana				
Michael W Harrison, P.E.	Harrison Engineering	139 Bluebird Lane	Whitehall, Montana 59759	(406) 287-5370
New York				
J. Fireovid, K. Yousef	SAIC Energy Solutions Div.	1 Marcus Boulevard	Albany, NY 12205	(518) 458-2249
North Carolina				
Hank Jackson, P.E.	P.O. Box 675		Weaverville, NC 28787-0675	(704) 658-0298
Oregon				
J. Karasaki PE, R. Ogle PE	CBG Consulting Engineers	6650 SW Redwood Lane, #355	Portland, OR 97224	(503) 620-3232
Texas				
Jeff S. Haberl	Energy Systems Laboratory	Texas A&M University	College Stn., TX 77843-3123	(409) 845-6065
Washington				
Steve Byrne	ITEM Systems, suite 344	321 High School Road NE	Bainbridge Isl, WA 98110	(206) 855-9540
Gregory Banken, P.E.	Q-Metrics, Inc.	P.O. Box 3016	Woodinville, WA 98072	(205) 915-8590



The first two listings are newsgroups, not websites	
(net) sci.engr.heat-vent-ac	**HVAC** discussion group.
(net) sci.engr.lighting	**Lighting** discussion group.
These URLs, on the World-Wide Web, start with http://	
www.eren.doe.gov/buildings/ tools_directory/	**Building Energy Tools Directory** from theU.S. Department of Energy An electronic directory of software programs under four headings: Whole-Building Analysis, Codes and Standards, Materials/Components/Equipment/Systems, and Other Applications . See *User News*, Vol. 17, No. 4, p. 35.
www.bso.uiuc.edu	**BLAST** Support Office
www.energy.ca.gov/energy/cectext/ ETEC.html	**California Energy Commission's Energy Technology and Education Center**. See *User News* , Vol. 16, No. 1, p. 42.
www.hike.te.chiba-u.ac.jp/ikeda/ CIE/publ/110-94.html	**The International Commission on Illumination – CIE** See *User News* , Vol. 16, No. 1, p. 44.
www.eren.doe.gov/	**EREN**: Energy Efficiency and Renewable Energy Network of the U.S. Department of Energy . See *User News* , Vol. 16, No. 1, p. 44.
www.doe.gov/	**U.S. Department of Energy** . See *User News* , Vol. 15, No. 4, p. 1.
www.whitehouse.gov/	**The White House** home page contains an Interactive Citizens Handbook that lists U.S. Government servers by agency. Use this site as a jumping-off point to explore other Federal agencies. See *User News* , Vol. 15, No. 4, p. 1.
www.fedworld.gov/	**FedWorld** is the U.S. Government's Federal Information Network home page. It lists web servers, ftp, gopher, and telnet sites and is organized by subject categories. See *User News*, Vol. 16, No. 2, p. 22.
www.fedworld.gov/ntis/ntishome.html	**National Technical Information Service** NTIS gathers and markets scientific, technical and business-related information.
www.caddet-ee.org	**Center for the Analysis and Dissemination of Demonstrated Energy Technologies** An IEA program for collecting and disseminating information on, energy-efficient and renewable energy technologies. See *User News* , Vol. 16, No. 2, p. 23.
crest.org/aceee	**American Council for an Energy-Efficient Economy** A non-profit organization for the advancement of energy efficiency. See *User News* , Vol. 16, No. 2, p. 23.
www.ashrae.org	**American Society of Heating, Refrigeration and Air-Conditioning** An international membership organization for HVAC professionals. *User News* , Vol. 16, No. 3, p. 31.
www.cisti.nrc.ca/irc/irccontents.html	**[Canadian] Institute for Research in Construction** IRC is part of the NRC, Canada's premier science and technology agency. See *User News* , Vol. 16, No. 3, p. 31.
next1.mae.okstate.edu/ibpsa/	**International Building Performance Simulation Association** An international society of building performance simulation professionals. See *User News*, Vol. 16, No. 4, p. 35.
www.fsec.ucf.edu/	**Florida Solar Energy Center** State of Florida's energy institute specializing in energy research and education in partnership with private and public organizations. See *User News*, Vol. 17, No. 1, p. 29.

eande.lbl.gov/BTP/WDG/ **/RESFEN/resfen.html** **/SUPERLITE/superlite2.html** **/WDG.html**	**Download Fenestration software from LBNL** See *User News*, Vol. 17, No. 1, p. 14. **RESFEN-2.4** – calculates residential fenestration heating and cooling energy use/costs **SUPERLITE-2.0** – calculates daylight illuminance distributions for room geometries **WINDOW-4.1** – thermal analysis program to characterize window product performance
http://www.energy.ca.gov/reports/ **title24/index.html**	**State of California's Title 24 Building Energy Standards** See *User News*, Vol. 17., No. 2, p. 25.
fcn.state.fl.us/fdi/fdi-home.htm	**State of Florida's Design Initiative (FDI)** See *User News*, Vol. 17, No. 2, p. 25.
fcn.state.fl.us/fdi/edesign/online/ **edo.htm**	***e-design,*** the online newsletter for Florida's Design Initiative See *User News*, Vol. 17, No. 2, p. 25.
www.energy.wsu.edu/ep/ **wsu.edu/ep/eic/** **wsu.edu/ep/eic/eicsoft.htm** **wsu.edu/ep/eic/eicfiles.htm**	The **Energy Program (EP)** of Washington State U. *User News*, Vol. 17, No. 3, p.26. **Energy Ideas Clearinghouse**, 925 Plum St S.E., Olympia, WA 98504-3171 (360) 956-2237 Software and files from the Energy Ideas Clearinhouse More download-able energy software from the Energy Ideas Clearinhouse
eande.lbl.gov/CBS/VH/advisor.html	The **Virtual Home Energy Advisor** from LBNL's Center for Building science. Run a quick heating-cooling model and see how much homes in your region can save. See *User News*, Vol. 17, No. 3, p.26.
www.pge.com/customer_services/ **other/pec/homepage/pec.html**	Pacific Gas & Electric's **Energy Center** located in San Francisco, CA. See *User News*, Vol. 17, No. 4, p. 35
dial.uwaterloo.ca/~watsun/home.htm	**Watsun Simulation Laboratory** was established with the support of the National Research Council of Canada. Its mission is to develop general purpose simulation software for solar energy system simulation performance. See *User News*, Vol. 17, No. 4, p. 35.
www.csemag.com/	An online version of **Consulting-Specifying Engineer Magazine** See *User News*, Vol. 17, No. 4, p. 35.
www.homeenergy.org	**Home Energy Magazine** An impartial source of analysis to aid the energy practitioner and the public in making informed decisions on energy conservation measures. See *User News*, Vol. 17, No. 1, p. 29 and Vol. 17, No. 4, p. 1.

DOE-2 RESOURCE CENTERS

The people listed here have agreed to be primary contacts for DOE-2 program users in their respective countries. Each resource center has the latest program documentation, all back issues of the User News, and recent LBNL reports pertaining to DOE-2. These resource centers will receive copies of all new reports and documentation. Program users can then make arrangements to get photocopies of the new material for a nominal cost. We hope to establish resource centers in other countries; please contact us if you are interested in establishing a center in your area.

South America Prof. Roberto Lamberts Universidade Federal de Santa Catarina Campus Universitario—Trindade Cx. Postal 476 88049 Florianopolis SC BRASIL Telephone: (55)482-31-9272 Fax: (55)48-231-9770 Lamberts@ecv.ufsc.BR	**Australasia** Dr. Deo K. Prasad/P. C. Thomas SOLARCH University of New South Wales P.O. Box 1 Kensington, N.S.W. 2033 AUSTRALIA Telephone: (61)-2-9311-7136 (P.C. Thomas) Fax: (61) 2-9662-1378 PC.Thomas@unsw.EDU.AU
Portugal, Spain, Italy, and Greece Antonio Rego Teixeira ITIME Unidade de Energia Estrada do Paco do Lumiar 1699 Lisboa PORTUGAL Telephone: (351) 1-716-4096 Fax: (351) 1-716-4305 itime.ue@mail.telpac.pt	**Australia** Murray Mason ACADS BSG 16 High Street Glen Iris VIC. 3146 AUSTRALIA Telephone: (61) 885 6586 Fax: (61) 885 5974
Singapore, Malaysia, Indonesia, Thailand, and the Philippines WONG Yew Wah, Raymond Nanyang Technological University School of Mechanical and Production Engineering Nanyang Avenue Singapore 2263 REPUBLIC OF SINGAPORE Telephone: (65)799-5543 Fax: (65)791-1859 mywwong@ntuvax.ntu.ac.sg	**Germany** B. Barath or G. Morgenstern Ingenieurbüro Barath & Wagner GmnH Postfach 20 21 41 D-41552 Kaarst GERMANY Telephone: (0049) 2131 75 74 90 12 G. Morgenstern Fax: (0049) 2131 75 74 90 29
Hong Kong, China, Taiwan, Japan and Korea Dr. Sam Chun-Man HUI or K.P. Cheung Department of Architecture The University of Hong Kong Pokfulam Road Hong Kong (SAR) CHINA http://arch.hku.hk/research/BEER/doe2/doe2.htm Telephone: (852) 2123 (direct to Sam Hui) Fax: (852) 2559-6484 Hui pager 7116 3808 a/c 1830 cmhui@hku.hk	**Switzerland** René Meldem Meldem Energie SA Ch. De l'Ancienne Pointe 1 CH-1920 Martigny SWITZERLAND Telephone: (41) 26 22 96 96 Fax: (41) 26 22 96 97 meldem.energie@bluewin.ch

DOE-2 RESOURCE CENTERS -- continued

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DOE-2 PROGRAM DOCUMENTATION

DOE-2 documentation is available from two sources.

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Also, many of the PC vendors of DOE-2 offer some or all of the documentation when you buy their program. Names and addresses of all DOE-2 vendors are found in the "DOE-2 Directory of Program Related Software and Services" in this issue.

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